

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

#### (PCT Article 36 and Rule 70)

|   |   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
|---|---|--|---|----------------------|--|----------|--------------------------------------|--|-------------------------------------|----------------------------|---|---|-------------------------------------|-------------------------|--------------------------------------|--|---------------------------------------|---|
| Applicant's or agent's file reference<br>K2271PCT   | <b>FOR FURTHER ACTION</b><br><small>See Form PCT/IPEA/416</small>   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| International application No.<br>PCT/JP2004/008152  | International filing date (day/month/year)<br>04.06.2004  | Priority date (day/month/year)<br>06.06.2003 |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| International Patent Classification (IPC) or national classification and IPC<br>B21B27/10, C10M101/02   |   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <b>Applicant</b><br><b>NIPPON STEEL CORPORATION et al.</b>  |   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> |   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <p>4. This report contains indications relating to the following items:</p> <table> <tbody> <tr> <td><input checked="" type="checkbox"/> Box No. I</td> <td>Basis of the opinion</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/> Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/> Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/> Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/> Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/> Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </tbody> </table>   |   |  | <input checked="" type="checkbox"/> Box No. I | Basis of the opinion | <input checked="" type="checkbox"/> Box No. II | Priority | <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> Box No. VI | Certain documents cited | <input type="checkbox"/> Box No. VII | Certain defects in the international application | <input type="checkbox"/> Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> Box No. I   | Basis of the opinion  |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input checked="" type="checkbox"/> Box No. II  | Priority  |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. IV   | Lack of unity of invention  |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input checked="" type="checkbox"/> Box No. V   | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. VI   | Certain documents cited   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. VII  | Certain defects in the international application  |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. VIII   | Certain observations on the international application   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| Date of submission of the demand<br>09.08.2004  | Date of completion of this report<br>27.12.2004   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| Name and mailing address of the international preliminary examining authority:<br><br>European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465  | Authorized Officer<br><b>Forciniti, M</b><br>Telephone No. +49 89 2399-7903   |  |   |                      |  |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |

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INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITYInternational application No.  
PCT/JP2004/008152

## Box No. I Basis of the report

- With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
- With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
  - a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
  - The amendments have resulted in the cancellation of:
    - the description, pages
    - the claims, Nos.
    - the drawings, sheets/figs
    - the sequence listing (*specify*):
    - any table(s) related to sequence listing (*specify*):
  - This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
    - the description, pages
    - the claims, Nos.
    - the drawings, sheets/figs
    - the sequence listing (*specify*):
    - any table(s) related to sequence listing (*specify*):

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## Description, Pages

|           |  |
|-----------|--|
| 1-6, 8-22 | as originally filed                              |
| 7         | received on 10.12.2004 with letter of 10.12.2004 |

## Claims, Numbers

|     |  |
|-----|--|
| 1-2 | received on 10.12.2004 with letter of 10.12.2004 |
|-----|--|

## Drawings, Sheets

|         |                     |
|---------|---------------------|
| 1/2-2/2 | as originally filed |
|---------|---------------------|

a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

- The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):
- This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/JP2004/008152

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**Box No. II Priority**

1.  This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
  - copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
  - translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2.  This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

|                               |             |     |
|-------------------------------|-------------|-----|
| Novelty (N)                   | Yes: Claims | 1-2 |
|                               | No: Claims  |     |
| Inventive step (IS)           | Yes: Claims | 1-2 |
|                               | No: Claims  |     |
| Industrial applicability (IA) | Yes: Claims | 1-2 |
|                               | No: Claims  |     |

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/JP2004/008152

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**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. The following documents are referred to in this communication:  
  
**D1 : JP-A 5306397**
2. Document **D1** is considered to represent the most relevant state of the art for the subject-matter of independent **claim 1**. This claim differs from **D1** in principal in that:
  - (i) The lubricant has a viscosity of 800 mm<sup>2</sup>/s (=800cST) or less at 40°C.
  - (ii) A non combustible gas is used whose flow rate is 2000 cm<sup>3</sup>/min.
  - (iii) The flow velocity of the gas is 1 m/s or higher.
  - (iv) The amount of oil per square meter of roll surface is from 0.01cm<sup>3</sup> to 20cm<sup>3</sup>.
  - (v) The grain size of the granulated or atomized lubricant is 1 mm or smaller.
- 2.1 The subject-matter of **claims 1** is therefore novel (Article 33(2) PCT).
- 2.2 The features according to (i) to (v) solve, in a non foreseeable manner with respect to the available prior art **D1**, the problem of lowering frictional force to reduce roll abrasion and rolling energy and to enhance the surface quality. **Claim 1** is hence considered as involving an inventive step (Article 33(3) PCT).
3. **Claim 2** is dependent on **claim 1** and as such also meets the requirements of the PCT with respect to novelty and inventive step.
4. The subject- matter of **claims 1 to 2** is, without any doubts, industrially applicable (Article 33(4) PCT).

## CLAIMS

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SIEBERTSTR. 481675 MÜNCHEN  
IAP12 Rec'd PCT/PTO 06 DEC 2005  
10. Dez. 2004

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What is claimed is:

1. A lubricated hot rolling method,  
using a lubricating oil which contains one kind or two  
or more kinds among an high-basic alkaline-earth metal  
phenate, high-basic alkaline-earth metal carboxylate, high-  
basic alkaline-earth salicylate, or high-basic alkaline-  
earth metal sulfonate having a basicity of 40 mgKOH/g or  
higher, and has a viscosity at 40°C of 800 cSt or less, said  
lubricated hot rolling method comprising the step of:

supplying, when a material to be rolled is supplied  
between two rolls, said lubricating oil to said rolls, by  
using a noncombustible gas whose flow rate for one  
lubricating nozzle is 2000 cm<sup>3</sup> or higher per minute, and  
whose flow velocity is 1 m per second or higher, in 0.01 cm<sup>3</sup>  
or more and 20 cm<sup>3</sup> or less per 1 m<sup>2</sup> of surface area of said  
rolls, after said lubricating oil is granulated or atomized  
into particulates having an average size of 1 mm or smaller.

2. The lubricated hot rolling method according to  
claim 1, wherein

the supply of said lubricating oil is started before  
said material to be rolled is bit between said two rolls,  
and an amount supplied of said lubricating oil is 1 cm<sup>3</sup> or  
smaller per 1 m<sup>2</sup> of surface area of said rolls.

any fire accident, when a lubricating oil which is added with one kind or two or more kinds among high-basic alkaline-earth metal phenate, high-basic alkaline-earth metal carboxylate, high-basic alkaline-earth metal salicylate, high-basic alkaline-earth metal sulfonate, and the like, is supplied by a gas atomizing method.

After dedicated examinations to solve the problems, the inventor discovered that it is possible to perform a safe and stable lubricated hot rolling while preventing fire from occurring even if a lubricating oil is supplied by the gas atomizing method in which the aforesaid high-basic alkaline-earth metal compound of relatively high viscosity is blended, with the following conditions:

- (1) the average particulate size of the lubricating oil is made to be less than 1 mm,
- (2) the flow rate of the noncombustible gas (for example, air, helium, nitrogen, argon, or the like) sprayed concurrently with the lubricating oil in a form of particulates is made to be 2000 cm<sup>3</sup> or more per minute,
- (3) the spraying speed of the gas is made to be 1 m or more per second, and
- (4) the maximum amount of lubrication supply is made to be 20 cm<sup>3</sup> or less per 1 m<sup>2</sup> of the roll surface area.

In order to prevent fire caused by the lubricating oil, for example, scattering of the lubricating oil sprayed from the nozzle to areas other than the rolls should be prevented as much as possible, and 100% of the lubricating oil sprayed from the nozzle should adhere to the roll surface. This is because that when the lubricating oil